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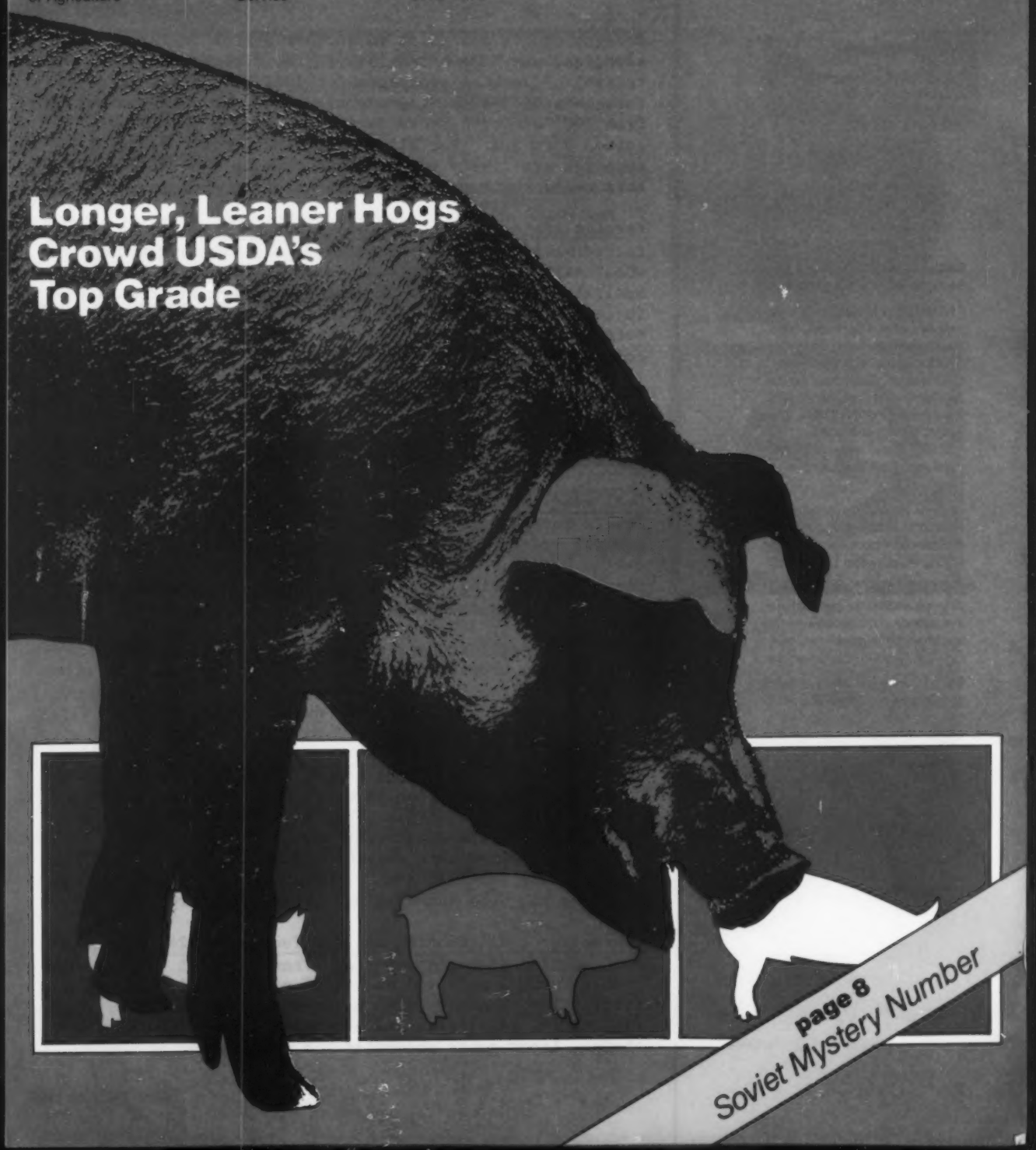

Longer, Leaner Hogs Crowd USDA's Top Grade

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Soviet Mystery Number

Editor:
Eric Van Chantfort

Editorial Assistant:
Martha R. Evans

(202) 447-8915

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PERSPECTIVES

Present conditions point to another season of large crop supplies, say USDA economists in their first "highly tentative" look at prospects for 1982/83. Their midpoint forecasts of 1982 U.S. production show wheat down about 5% from 1981's output, corn down 6%, soybeans up 3%, and cotton down 20%. For all except wheat, however, total supplies are likely to be larger than in the 1981/82 year because of the huge stocks built up from 1981 production.

Foreign grain supplies may also increase. Odds now favor record world wheat output for 1982/83, with lower U.S. wheat exports. But for U.S. corn, soybeans, and cotton, analysts expect a boost in demand--foreign and domestic--fueled by some general economic recovery. Demand next season should be strong enough to reduce stocks of U.S. cotton, but not so for wheat, corn, and soybeans.

Season-average farm prices may be slightly better than 1981/82 levels--even with large crops and further buildup of grain stocks--because of higher loan rates and heavy use of the farmer-owned reserve and CCC loan programs.

U.S. meat supplies are expected to remain below year-ago levels for the rest of this year, with livestock and poultry prices considerably above year-earlier levels.

Costs of producing 11 major U.S. crops rose 15.7% per acre in 1981 (excluding the cost of land). Costs rose the most for peanuts, up 36% from 1980, and cotton, up 21%. Oats showed the smallest gain--11 percent. Corn, sorghum, soybeans, flax, wheat, sunflowers, barley, and rice increased 12%-16%. Unlike per-acre costs, costs per unit of output actually dropped in some cases due to higher yields.

Foreign sources still own less than 1% of our agricultural land, says the latest USDA study. Foreign owners reported holdings of 12.7 million acres of U.S. farm and forestry land as of Dec. 31, 1981. That's 4.9 million acres higher than a year earlier, but only 500,000 acres were new transfers of land into foreign ownership. Some 2.3 million reflect late filings, and 2.1 million were added when the owner--a big U.S. corporation--became 20% foreign-held.

Consumers' 1981 spending on farm foods hit $285 billion, not counting fish and imports. That's up $25 billion from 1980. Farmers received about 30% or $85 billion of the total. The remaining $200 billion went to handlers, processors, retailers, and others in the food marketing chain. Labor costs accounted for $88 billion of that.

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FEATURES

Longer, Leaner Hogs Crowd USDA's Top Grade *by Eric Van Chantfort* 4

A longer, leaner hog is coming off U.S. producers' finishing lines, muscling out its less meaty competitors. In a recent study, seven out of ten hog carcasses qualified for USDA's top grade. Improvements in hogs have been so dramatic in the last 12 years that the grading system itself may be due for some modifications, according to analyst Karen Parham.

Soviet Mystery Number Cloaks Agricultural Shortfalls *by Daniel R. Williamson* 8

How poor was the 1981 Soviet grain harvest? For some reason, the Soviets won't say. That produces a fascinating mystery for Western observers. Economist Anton Malish examines the implications of last year's Soviet shortfall and some possible motives behind the Kremlin's reticence.

IPM: A Three-Pronged Attack on Agricultural Pests *by John Schaub and Katherine Reichelderfer* 11

Many farmers are expanding their pest control arsenals and saving money at the same time. How? By combining cultural methods, chemicals, and biological controls. In many tests, these integrated pest management programs are proving a better alternative to routine applications of expensive pesticides.

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Longer, Leaner Hogs Crowd USDA's Top Grade

A longer, leaner hog is coming off U.S. producers' finishing lines.

This sleek, late-model hog has more muscle and less fat than its predecessor of the late 1960's. Most important, it delivers more lean pork to the pound: ham, loin, picnic shoulder, and Boston butt.

"If producers want top dollar for their market hogs, they have to provide what packers and consumers want," says Karen Parham, an economist with USDA's Economic Research Service.

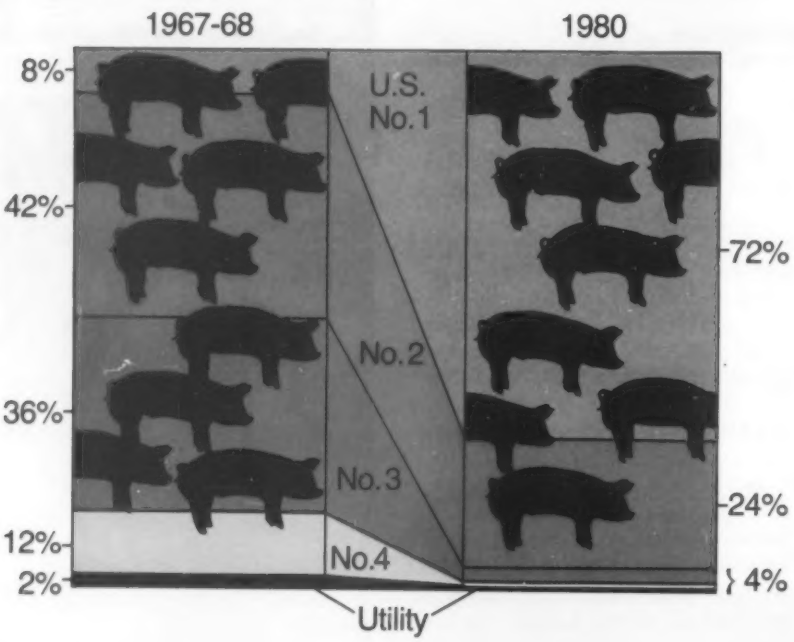
"Consumers have signaled that they don't want a fat pork chop. You either trim off the fat or you produce a hog that has less fat in the first place," she adds.

That's exactly what U.S. producers are doing, according to a recently completed USDA study. The results show a dramatic improvement in hog carcass grades between 1968 and 1980—so dramatic, in fact, that USDA grade standards are being reviewed for possible updating.

Today's Hogs Are Longer and Leaner

Grade	1967-68	1980
	Average carcass length *(inches)*	
U.S. No. 1	30.4	31.0
U.S. No. 2	30.3	30.8
U.S. No. 3	30.4	30.8
	Average backfat thickness *(inches)*	
U.S. No. 1	1.51	1.22
U.S. No. 2	1.79	1.56
U.S. No. 3	2.13	1.94

More Than 70% of Slaughter Hog Carcasses Graded U.S. No. 1 in 1980, Compared with Only 8% in the Late 1960's



In 1968, only 8 out of 100 slaughter hog carcasses qualified for USDA's leanest, meatiest grade—U.S. No. 1. By 1980, 72 out of 100 made the grade, says economist Parham. In the same period, average carcass length grew by a half-inch and average backfat thickness shrunk by a quarter-inch.

These findings are based on nationwide surveys. About 36,000 carcasses in 62 different meatpacking plants were measured and graded by a USDA meat grader in 1980, and 57,000 carcasses in 60 plants were sampled in the late 1960's.

Today, virtually all slaughter hogs are either U.S. No. 1 or No. 2, according to the study. Ninety-six percent of the 1980 sample earned one of these top two grades, while 12 years earlier half of all slaughter hogs fell into the lower grades, No. 3, No. 4, or Utility.

Fast-Paced Changes

How and why did such significant changes occur in such a short time span? The answer partly involves the decisions of consumers, packers, and producers. It also involves USDA's grading system, which provides uniform standards for translating decisions into actions.

"In the past two decades, preferences for livestock products have changed. Consumers now want leaner meats," Parham says.

"Also, during this period, the demand for animal fats declined rapidly because of more plentiful vegetable oil substitutes."

In 1960, for example, the average American diet included about 7.5 pounds of lard a year. In 1968, 5.5 pounds. By 1980, per capita consumption had dropped to only 2.5 pounds—one-third the 1960 level. (These figures exclude lard use in margarine, shortening, and nonfood products, but include home use, use in bakery products and potato chips, and use by fast food outlets.)

As consumer preferences changed, so did the demands of retailers, processors, and meatpackers. Farmers responded to these changes by improving breeds and cross breeding to produce a leaner hog, Parham says.

Without some system of uniform grading standards, these decisions might have taken a lot longer to work their way from consumer to producer. Grades serve not only as a tool for measuring change—as they did in the 1968 and 1980 surveys—but they also provide a common "language" for communicating the animal characteristics desired by consumers down the production line.

Grading is used to categorize products with similar attributes, says Russell Knister, chief of the livestock standardization branch in USDA's Agricultural Marketing Service. The Agricultural Marketing Service (AMS) is the agency responsible for formulating grade standards.

"Their basic purpose is to communicate," Knister explains, "and their ultimate effect is to provide information for producers to improve the animals they are raising."

How Grades Encourage Leaner Hogs

The way the grading system works is fairly simple. USDA pork carcass grades No. 1 through No. 4 are designed to estimate the yield of major lean meat cuts. The higher the grade, the greater the likely percentage of meat—rather than fat—in the total carcass weight.

Since the grades indicate the approximate value of the carcass based on lean meat yield, they make it possible to buy and sell pork carcasses on the basis of their worth. In this way, they can affect the type of animal produced.

"Packers don't buy strictly by grade, but they have a good idea of grade when they bid for hogs," says USDA livestock economist Leland Southard.

Standardized grades help packers determine value differences in the market hogs they buy and the pork they sell, says AMS' Knister. Price differentials between grades may not be as large as these value differences, but higher returns do provide an incentive to produce leaner hogs.

Live hog grades (which are parallel to hog carcass grades) also help producers adapt to changing demand patterns. Grades provide a guide for choosing breeding stock and a way for producers to measure the efficiency of various production, feeding, and marketing programs by monitoring the quality of hog produced.

Grade standards were last changed in 1968 because of the progress producers had made since the early 1960's in turning out hogs with less fat and more lean. Part of the change involved the creation of a new U.S. No. 1 grade to properly identify the top-of-the-line hog then being produced. Standards for the former No. 1, No. 2, and No. 3 grades were bumped down to No. 2, No. 3, and No. 4.

The major reason for the 1980 survey was to find out what had happened since 1968.

The results illustrated how much slaughter hogs had improved in just 12 years. In fact, farmers are now producing top-grade, lean hogs in such overwhelming proportions that many USDA and industry analysts are wondering if current grading standards are already outdated.

Are the Standards Obsolete?

"We have the responsibility in AMS of keeping grades current. When the product changes, it's necessary to review the standards," Knister explains.

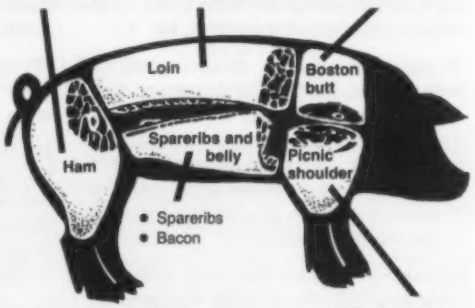
A U.S. No. 1 Hog Carcass Yields More Lean Meat and Less Lard Than a No. 4

Wholesale Yields of Average 165 lb. Slaughter Hog Carcass*

Cuts	U.S. No. 1	U.S. No. 4
	pounds	
Four major lean cuts:		
Ham	37.6	28.3
Loin	32.0	23.4
Picnic shoulder	15.7	12.2
Boston butt	12.9	9.5
Total	98.2	73.4
Other cuts:		
Spareribs	5.9	4.8
Belly	21.3	26.1
Jowls	4.0	5.5
Neck bones	2.6	1.9
Front feet	2.7	2.2
Lean trim	9.6	8.7
Total	46.1	49.2
Lard	15.9	30.6
Hind feet, tail, skin, etc.	4.8	11.8
Total carcass weight	165.0	165.0

Some Common Retail Cuts:

- Center slices
- Rump roast
- Shank
- Cured ham
- Loin chops
- Rib chops
- Loin and rib roasts
- Canadian style bacon
- Boston butt roast
- Blade steaks



- Picnic roasts
- Arm steaks
- Cured picnic

* Based on USDA cutting and trimming methods.

Source: AMS Market News, USDA.

How Carcasses Make the Grade

USDA pork carcass grades U.S. No. 1 through No. 4 are designed to measure *meat yield*, so they're not comparable to beef grades like Prime, Choice, and Good which measure *meat quality* attributes.

U.S. Utility is a quality evaluation, indicating unacceptable lean quality, an oily carcass, or a belly too thin for bacon production. The meat is still good for human consumption, but it cannot receive a No. 1 through No. 4 grade and will probably end up as ground or canned pork.

With the exception of U.S. Utility, pork carcass grades are based on the expected combined yield of the four major lean meat cuts: ham, loin, picnic shoulder, and Boston butt.

Graders don't measure meat yield directly. They look at the three principal grade-determining factors: backfat thickness, carcass length or weight, and muscling score (the thickness of muscle in relation to skeletal size).

The thinner the backfat and the thicker the muscling relative to carcass length and weight, the greater the probable meat yield.

For the average 165-pound hog carcass, the four major lean meat cuts will total about 98 pounds for a U.S. No. 1 hog, 90 pounds for a No. 2 hog, 82 pounds for a No. 3, and 73 pounds for a No. 4.

That's a big difference. The U.S. No. 1 carcass, for example, yields an average of 25 pounds or one-third more meat in the four cuts than the No. 4.

Most hogs are sold after visual inspection of the live animal, though buyers still make grade and yield judgments. Only about a tenth of all slaughter hogs are sold under a grade and yield system where the producer is compensated based on actual carcass weight and grade.

"The standards are useful if they're telling producers what the packers need to sell pork to consumers," he says. "We have to consider whether the grades are telling anybody anything when most hogs produced today are U.S. No. 1."

Grades only specify minimum standards, leaving the top grade open-ended. Thus, some of the most significant variations in terms of the total hog population are not identified by the present grading system because such a heavy proportion of hogs are lumped together in the top grade.

Consider, for example, the expected yield of a U.S. No. 1 carcass. Based on the standards, yield of the four major lean meat cuts should comprise at least 53 percent of the carcass weight. These days, the average U.S. No. 1 carcass yields about 59.5 percent of its weight in the four cuts, but some yield less and some more.

Price premiums based exclusively on the USDA grades would reward equally those producers whose animals meet minimum U.S. No. 1 standards and those whose animals well exceed the standards.

"Producers who raise leaner, meatier hogs expect to get more money for them," Knister says.

Parham agrees. "An ideal grading system should classify together products with uniform characteristics determining their value, so that price can reflect differences in value and provide incentives for improvement," she says.

"In the past, the grading system has enabled higher prices to encourage grade improvements. If the system is to continue to differentiate among value, quality, and price, it may need to be modified so additional incentives can improve grade attributes."

Room for Improvement

Does all this mean that revisions in grading standards are coming?

"It's a possibility," says Daniel Stilwell, a livestock marketing specialist with AMS. "We have to evaluate all the information that's available before we can make any decisions."

"A decision on whether to revise the standards will probably be made within the next 12 months," adds Knister. The first notice would be an announcement in the *Federal Register* calling for public comment.

Whatever the decision, analysts say that there is plenty of room for additional improvements in hogs. Many farmers are already producing hogs well above minimum grade standards.

Further improvements, however, may be somewhat more difficult to write into grading standards than in the past, if standards are revised. As hogs get leaner, the potential for easy revisions in the grade-determining factors becomes more limited.

The 1980 survey, for instance, showed that backfat thickness—a major grading factor—averaged only 1.2 inches for U.S. No. 1 hogs. In the late 1960's, the figure was 1.5 inches.

"We may be nearing the practical limit for backfat thickness because packers want a minimum amount of backfat to protect the lean," Parham says.

"Instead, we may need to focus more on carcass length, or on a specific combination of length and weight," she notes.

Comments Stilwell: "Nothing is etched in granite. If it's decided that a change in grading standards should be proposed, we'll look at any criteria that can be used accurately and reliably." □

[*Based on special material provided by ERS economists Karen D. Parham, Donald B. Agnew, Leland Southard, and Lawrence Duewer, and AMS livestock specialists Russell B. Knister and Daniel E. Stilwell.*]

AGRICULTURAL ROUNDUP

Rural Economy Isn't What It Used To Be

Rural America now offers a highly diversified, service-oriented economy in which most residents look off the farm for their livelihood.

Farm and farm-related employment has declined steadily in the postwar period, according to Ed Smith and Herman Bluestone of USDA's Economic Research Service. By 1979, less than 13 percent of those employed in nonmetro areas worked in a farm-related job, compared with 30 percent in 1950.

Even farm families have become less dependent on farming for their total income, the two economists note. Since 1966, the nonfarm income of the average farm family has exceeded net farm income in every year except 1973 and 1974.

By 1980, nonfarm sources provided 62 percent of the average farm family's income. The percentage was higher for families on smaller farms, and lower for those on larger farms.

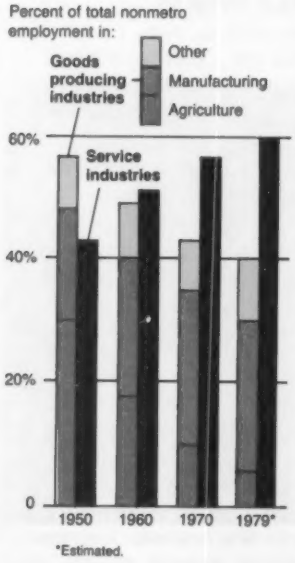
Another indicator is the number of counties where at least 20 percent of residents' income comes from farming. Since 1950, this number has dropped from over 2,000 counties (with 69 percent of the total nonmetro population) to under 700 (with only 14 percent of the nonmetro population).

Farm output is nearly two-thirds higher than it was in 1950, so agriculture is not a declining industry. The primary reason for reduced farm employment, less dependence on farm income, and fewer farm counties is that the farmer's productivity has increased so rapidly. In 1950, one farm worker produced enough to supply 15 people. Today, one farm worker produces enough for 78 people.

The three goods-producing sectors besides agriculture are manufacturing, mining, and construction. The manufacturing share of total nonmetro employment rose until about 1970 and then leveled off. The other two sectors are relatively small, and their employment shares have changed only fractionally.

In contrast to the goods-producing sectors, service-oriented industries have steadily increased their share of total employment in nonmetro areas. The service sector's share rose from less than 43 percent in 1950 to an estimated 60 percent in 1979.

Six Out of Ten Rural Workers Are Now Employed in Service Industries



Cotton's Costs from Shirt to Towel

How much of the sale price for a cotton garment goes back to the farmer? According to one economist, not that much.

"The portion of the retail price attributed to the cost of raw cotton is usually small, but it depends on the product," says Ed Glade of USDA's Economic Research Service.

Take, for example, a business shirt and a bath towel. The weight and costs of raw cotton are almost the same in both products—11.2 ounces and 56 cents for the shirt and 12 ounces and 57 cents for the towel. But the kind and amount of processing necessary for each item make a difference in the final price tag.

Even though the business shirt uses more finished cotton fabric than the towel—2.7 square yards compared with three-fourths of a yard—the cost of cotton is only 3.5 percent of the retail value of the shirt, in contrast to about 11.4 percent for the towel, Glade says.

The reason: The shirt requires more processing than the towel. On the average, turning cotton into a finished item involves about a half-dozen stages—and each adds to costs.

Denim jeans, cotton's most popular product form, provide a good example of how the process works.

One pound of raw cotton used to make denim has a farm value of 65 cents before ginning. Ginning adds 11 cents, and marketing contributes another 8, for an accumulated value of 84 cents at the mill. After textile processing (yarn, fabric, and finishing operations), 1 pound of cotton is worth $2.50.

Manufacturing the fabric into a finished product accounts for another $2.40, while wholesaling and retailing add $3.95. At this point, the retail value of 1 pound of cotton is $8.85.

Considering that it takes more than 2 pounds of cotton to make one pair of jeans, the retail price of a basic pair is more than $18. The farm price of the cotton used is about $1.63, or less than 9 percent of the value.

Although cotton's role can seem small in comparison with other inputs, a change in the cost of raw cotton can have a significant impact on the final price, according to Glade.

A 10-cent increase in the farm price of raw cotton could result in a retail price rise of $1 or more if all firms at all stages of processing insist on maintaining their gross operating margins and profits.

Farm Price is Small Part of Retail Value of Typical Cotton Products[1]

	Cotton Material		Average		Farm value as
	Fabric *(sq. yrds.)*	Raw cotton *(ounces)*	farm value	Retail value	percent of retail value
Business shirt	2.70	11.2	$0.56	$15.95	3.5%
Bath towel	0.75	12.0	$0.57	$ 4.98	11.4%
Denim jeans	2.49	34.2	$1.63	$18.95	8.6%

[1]Data for 1980.

Soviet Mystery Number Cloaks Agricultural Shortfalls

How poor was the 1981 Soviet grain crop?

While it's no secret that the USSR suffered its third consecutive shortfall, the Soviets refused to disclose official grain production statistics.

In previous years, the Kremlin has released harvest figures in its annual state plan fulfillment reports—even in years of far more disastrous shortfalls. But the grain statistics were omitted for 1981, and no reason was given.

That produces a fascinating mystery for Western observers: Why have the Soviets been so reluctant to release 1981 crop figures? Even if numbers are released later, an aura of mystery may linger concerning the delay.

In a recent analysis, economist Anton Malish, chief of the Eastern Europe-USSR Branch in USDA's Economic Research Service, examined the implications of last year's Soviet harvest and possible motives behind the Kremlin's reticence.

"Because grain production enjoys a special place in the Soviet mystique, one can be assured that the decision not to reveal the 1981 harvest statistics was a carefully calculated one in which both domestic and international arguments came into play," Malish suggests.

"The decision itself," he adds, "seems to have been made at the highest levels of the Soviet government. It involved the suppression of grain production data not only for the USSR as a whole, but for the major grain production republics as well."

Why the Secret?

Malish offers four possible answers:

1. The 1981 grain harvest was exceptionally poor. USDA experts estimate that the Soviets suffered about a 25-percent shortfall from their announced target of 236 million tons. A crop no larger than USDA's estimate of 175 million tons would represent a serious setback, but it would still far exceed some past harvests which the Soviets did report, such as the 140 million tons gleaned in 1975.

This raises a question: Could USDA be greatly overestimating the Soviet grain harvest? Possibly, but the USDA figure would have to be off considerably—20 percent too high—if the actual harvest came out as poor as the 140-million-ton low mark of recent years. Over the past 8 years, the USDA end-of-season estimate has been within 9 percent of the Soviets' announced number.

Experts also say that a crop in the range of 140 to 160 million tons should have triggered herd adjustments or distress slaughtering which would have shown up in monthly livestock statistics.

Given these considerations, Malish says that it's unlikely that crop size, alone, is behind the suppression of Soviet statistics.

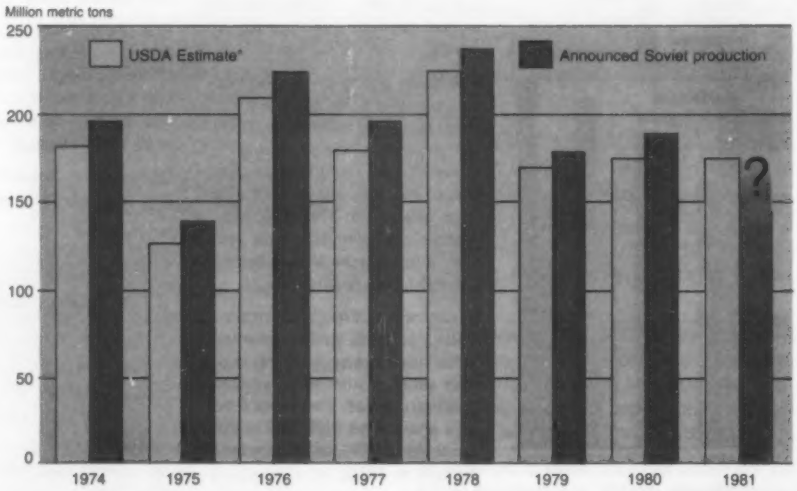
2. The number was withheld because of international implications. Expectations of large Soviet purchases would drive up world grain prices and might also strengthen the position of those who have advocated a trade embargo to pressure the Soviets.

By withholding harvest data, Malish suggests, the Soviets might have hoped to minimize prospects for an embargo, and also to keep international prices lower until their purchases could be made.

While the Soviets do withhold much economic data—such as grain stocks—for security reasons, the impact of the official harvest figure on overall trade flows would probably be minimal:

- Regardless of whether the Kremlin releases the official number, record Soviet grain imports had already been anticipated by world traders.

Year-End USDA Estimates Come Fairly Close to Mark in Sizing Up Soviet Grain Production



*End-of-season USDA estimate preceding the Soviet announcement of crop size. Between 1974 and 1980, USDA estimates were off by no more than 9% in any year, although all were on the low side. For 1981, however, some unofficial Soviet statements suggest that USSR grain production may have been 10-15 million tons below USDA's estimate of 175 million tons.

• Expected levels of grain imports would be about as much as the Soviet transportation system can handle.

• Virtually all of these imports—43 of an expected 44 million tons—have already been purchased or contracted for.

Withholding harvest figures to influence an embargo decision would also seem to offer little advantage.

"The major questions regarding trade sanctions have been openly discussed by U.S. policymakers. Recently, the President reaffirmed that farm exports would not be used as an instrument of foreign policy except in extreme situations as part of a broader embargo when national security is threatened and when the cooperation of other nations can be secured," Malish says.

"It's hard to believe the actual Soviet production number would contribute much to the formulation of U.S. policy in that area," he adds.

3. The number was withheld for domestic policy reasons. "Grain production is central to Soviet agriculture," Malish says, "and it plays an important role in the Soviet world view." The Soviets see grain supplies as a worrisome area of national vulnerability.

Given this mind-set, they may be very reluctant to publish such poor harvest results—particularly in view of deteriorating food supplies in provincial cities.

While holding the statistics back may cause some domestic unease, Malish says policymakers may have found it preferable to the "bureaucratic nightmare of a debate on how available supplies should be shared between the republics, or between cities and towns."

Another possible domestic incentive, he notes, could be to avoid the embarrassment of tacitly admitting that the just-announced Eleventh 5-Year Plan (1981-85) is already impossible to achieve. It calls for an annual average grain production of 239 million tons.

The Soviets may want to avoid the embarrassment that their new 5-year-plan already looks impossible to achieve.

If the 1981 crop was around 175 million tons, then the next four crops must average about 255 million tons to achieve the planned annual average. "The best the Soviets have ever done is 237 million tons, and most years they are well below that level," he says.

4. The number was withheld for political reasons. In the past, poor harvests were sometimes followed by political upheavals. In 1972 and 1976, ministers of agriculture were replaced after shortfalls. Earlier, two Soviet premiers—Georgi M. Malenkov in 1955, and Nikita Khrushchev in 1964—were ousted after crop failures.

"According to this line of reasoning," Malish surmises, "the harvest figure will be released when the Politburo announces related personnel changes."

Soviet Agricultural Problems

Whether the real reason for the mystery number is one of the above—or an entirely different motivation—the fact that the mystery exists at all underscores the deep problems plaguing Soviet agriculture.

While the fulfillment report omitted grain harvest figures, it did include some other agricultural data which point to an extremely poor 1981 crop year:

• In monetary terms, the gross agricultural output of 120 billion rubles was 12 percent below target and 6 percent below the 1978 peak.

• Sugarbeet production fell 24 percent from 1980's poor crop to 60.6 million tons, the worst harvest since 1963.

• Potato output, at 72 million tons, was up 7 percent over 1980, but still 17 percent below plan and the second poorest crop in 18 years.

Patching Up Soviet Agriculture

The Soviets are considering several program changes to infuse new vigor into their struggling agricultural system, according to analysts in USDA's Economic Research Service.

Party leaders are known to be deliberating over these proposals—some of which would be bitter ideological pills for them to swallow:

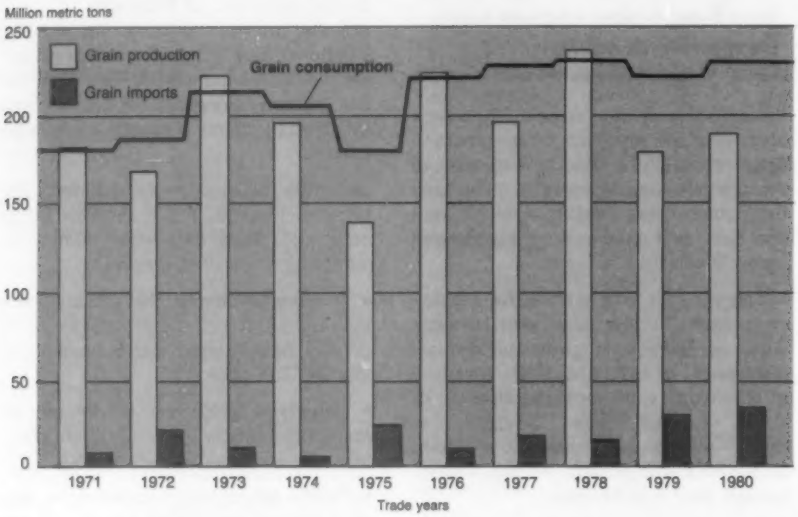
1. Creation of a "food program" to provide overall planning and financing for agriculture and associated industries such as farm inputs and implements, transportation, and storage. The result would resemble vertical integration, with activities planned from farm to store.

2. Reorganization of government and Party agricultural administration. Recently, ministries were created for fruits and vegetables and for chemical fertilizer manufacturing. A new department within the Party has been set up to oversee farm machinery production.

3. Expansion of production on private plots. Private plots, which comprise only 1.4 percent of all farmland in the USSR, "have long been recognized as an important source of food products," according to analyst Yuri Markish, a specialist on Soviet agricultural inputs and policy.

4. Provision of greater incentives for farm managers. Numerous spokesmen in the USSR, from General Secretary Leonid Brezhnev on down, have called for more independence for farm managers so that they can make production decisions which, in the past, were dictated by central planners.

Soviet Grain Production Struggles To Meet Consumption



• The harvest of sunflower, the major Soviet oilseed, reached only 4.6 million tons, 2 percent below last year and 28 percent below plan.

• Vegetable output was 25.6 million tons, 9 percent under target.

• Livestock production was also below goals. Milk production was 7 percent below plan, and meat output was 5 percent below. "In fact, shortages of meat and dairy products were so bad in 1981 that the Soviets established formal rationing using coupon systems in some provincial cities," according to USDA analyst Angel Byrne.

The only bright spots were cotton which, at 13.8 million bales, exceeded goals by 3 percent; and egg production which, at 71 billion, topped the goal by 2 percent.

Weather receives much of the blame for these dismal showings, but the Soviet agricultural sector is riddled with serious problems. For example, USDA analyst Thomas Bickerton notes that sunflower production has declined in recent years due to a lack of hybrid varieties, inadequate chemical inputs, chronic diseases, and poor farming technology.

Poor planning and management also hurt the Soviets. The sugarbeet crop suffered considerable loss last year when harvested sugarbeets were left to freeze in the fields. Once picked up—often by being bulldozed into piles and scooped up with tractor-mounted shovels—they contained so much foreign matter that processing equipment at plants broke down.

Problem Areas

Analysts cite these specific problem areas for Soviet agriculture:

• Fertilizer supplies and distribution. In 1980, Soviets produced 104 million tons of mineral fertilizer, 39 million tons short of the goal.

"Once produced, fertilizer delivered to farm railheads often sits uncovered until it coagulates into a concrete-like mass. Application techniques are nearly as wasteful," Malish says.

• Inferior agricultural machinery. It doesn't match the standards of machinery produced for heavy industry or military use. Maintenance problems are aggravated by frequent shortages of key spare parts.

• Lack of pesticides and herbicides. Weeds, rodents, and insects often inflict substantial damage on crops.

• Painfully slow dissemination of agricultural research to the farm level. Although Soviet agricultural research is probably equal to U.S. efforts, the results aren't quickly applied to production practices.

• Lack of incentive for farmers to increase productivity. Although incomes have been rising, desirable consumer goods aren't readily available for purchase.

• Labor shortages. Farmworkers leave the countryside for military training, for higher-paying construction work, for military or civilian jobs which allow migration to towns, and other such enticements.

• Obstacles to the movement of agricultural produce. Reception centers and elevators are often far from farms. Hard surface farm roads are few. Cold storage facilities are inadequate. As a result of these shortcomings, a large part of farm production never makes it to Soviet dinner tables.

The Soviets are, of course, all too aware of these agricultural problems. Yet capital investment in agriculture has leveled off.

Instead, Malish says, the USSR is counting on more efficient use of existing resources with the hope that the 3-year spell of miserable weather is over. But, even under best conditions, Soviet production is expected to fall well short of the new goals for grain and meat—especially after 1981's dismal showing. □

[*Based on special materials provided by Anton Malish and Jim Cole of the ERS Eastern Europe-USSR Branch.*]

IPM: A Three-Pronged Attack on Agricultural Pests

Experiments this past decade measured some of the benefits of integrated pest management (IPM). The technique combines cultural methods, chemicals, and biological controls to curtail damage to crops and livestock caused by more than 8,000 insects, 2,000 weeds, 8,000 fungi, 250 viruses, and 160 bacteria.

IPM doesn't eliminate the need for pesticides, but it may reduce their use. That's important because of concern about possible adverse effects of chemicals on humans and wildlife, such as fishkills from water runoff containing pesticides, reproductive difficulties, and other effects that may appear in laboratory test animals.

Newer, stricter laws make it more difficult and expensive for manufacturers to register new pesticides, while older chemicals are being taken off the market. In recent years, DDT, aldrin, and dieldrin were banned.

Pests can also develop resistance to over-used pesticides. When this occurs, pest damage begins to mount and producers often increase chemical dosages, which can lead to further environmental concerns, or they may switch to other chemicals that may be higher priced. By using natural pest enemies or alternating chemical materials, IPM can reduce the need for frequent applications of a pesticide, thus extending its useful life.

Pesticides are petroleum based, which has led to higher costs. Greater use of pesticides and increased costs have escalated farmers' expenditures. Currently, they are spending about $3.1 billion annually on pesticides, compared with $2.0 billion in 1977.

Some IPM programs can be designed for individual producers, while other programs are effective only if adopted across broad areas covering many farms. Programs based on a combination of resistant plant varieties, delayed spraying, field monitoring, and destruction of crop residues are IPM strategies a single farmer might employ.

Many of these elements also are used in broader IPM systems. But programs using predators, parasites, and sterile insects commonly require wide-area adoption because the control insects migrate to where pest populations are the largest. Consequently, an individual producer has no assurance that they won't move to a neighbor's field well before the pest population on the target field is under control.

Cooperation among producers is needed to develop an area-wide IPM program. This may be voluntary or by producer referendum where pest management responsibility is given to a regulatory body.

Cotton Tests

Two large-area IPM programs for cotton insect control were tested in North Carolina and Mississippi during the 1978, 1979, and 1980 seasons. One voluntary program, underwritten by federal funds, used post-season control of adult weevils, stalk destruction, field monitoring, ovicides, delayed spraying, and diapause control.

Another program, also underwritten by federal funds, required all producers to participate and used the same components plus the release of sterile boll weevils and a pesticide that prevents weevils from reaching sexual maturity. Both programs worked well technically and had favorable benefit/cost ratios for producers.

IPM Demonstrates Its Benefits in Two Large-Area Cotton Insect Control Tests[1]

	Current control practices	IPM Program	
		with sterile weevils	without sterile weevils
Insecticides used (mil. lbs.)	34.0	24.6	18.5
Application rates (lbs. per acre)	5.0	3.7	2.7
Control costs to producers ($mil.)	191	170	137
Total cotton production (mil. lbs.)	2,890	2,991	3,045

[1] Federally funded tests in North Carolina and Mississippi during the 1978, 1979, and 1980 seasons. Both IPM programs used post-season control of adult weevils, stalk destruction, field monitoring, ovicides, delayed spraying, and diapause control.

These trial programs and other analysis indicate the first system—without sterile boll weevils—would result in a 3-percent gain in average yields across the infested area compared with yields under previous insect control practices. With this system, average cotton insect control costs to farmers would decline 11 percent.

Insecticide use for the region would fall 28 percent, a decrease of 9.4 million pounds or 1.3 pounds per acre. Net benefits to producers and consumers would be $2.6 billion over 12 years in 1979 dollars. The overall benefits would be 44 times greater than the costs incurred.

In the IPM program adding sterile boll weevils, cotton yields were projected to increase 5 percent and control costs to farmers would decrease 28 percent, compared with previous practices. Pesticide use would be cut about in half—from 34 million pounds per year to 18.5 million. Average use would decline from 5 pounds per acre to 2.7 pounds. Net market benefits were $3.9 billion for 12 years and 17 times greater than overall costs.

Adopting either program would increase production and lower cotton prices for consumers and lead to increased exports of 2 to 3 percent. Another advantage: less insecticide in the environment.

Not everyone would benefit, however. Less insect damage would boost production and probably reduce farm prices for cotton. Producers in boll weevil infested areas would still come out ahead because their higher yields and lower pest control expenses would more than offset the price decline. On the other hand, cotton farmers in boll weevil free areas would earn smaller returns.

Other Crops, Too

IPM programs can also aid soybean, corn, and peanut farmers. Economists compared North Carolina farms using IPM against those with more traditional control methods. IPM participants monitored weeds, diseases, nematodes, insects, and soil fertility to make sure appropriate pesticides and fertilizers were applied at the proper time.

After accounting for differences in management practices, soils, and other non-IPM factors, North Carolina economist Gerald Carlson found that IPM increased yields, reduced pesticide use, and increased net returns for all three crops.

Using 1979-80 average prices, gross gains per acre associated with IPM were $54 for soybeans, $49 for corn, and $37 for peanuts. The North Carolina program is run as a cooperative financed by growers.

Sometimes two or more crops host a common pest. Such cases require cooperation and coordination among growers across a large region to achieve effective pest control. For instance, the green peach aphid overwinters in Pacific Northwest peach orchards where it poses no threat. But it can severely damage potatoes and sugarbeets by carrying diseases and physically destroying the crops.

Economists at Washington State University and ERS found that if the aphid is controlled in its orchard overwintering sites, potato producers would not have to routinely apply systemic insecticides to control it. Fall potato production costs in the state could be reduced more than $20 million per year. And Washington sugarbeet growers would save $440,000 annually by using less insecticide.

If peach producers initiated overwintering controls of the aphid in the orchards, their production costs would rise only 1 percent.

Fruit growers in an IPM program in Wayne County, New York, paid $12 per acre annually to receive intensive pest monitoring and advisory services. Pest specialists visited orchards 20-25 times each year to assist the operator with control decisions.

Economist Gerald White of Cornell University found IPM participants realized an average of $25.75 per acre in pesticide savings, while maintaining yield and quality of the fruit. Even subtracting pesticide advisory fees, growers saved over $13 per acre in 1978. The program, originally supported by the Extension Service, is now administered through a private grower cooperative.

Predators and Parasites

The use of natural enemies—predators, parasites and pathogens—for biological control of pests can be an effective method used alone or in conjunction with cultural or chemical measures.

One effective parasite against the alfalfa weevil is **Bathyplectus curculionis** (BC), a wasp released in a USDA and state cooperative program during the late 1950's through the early 1970's in various alfalfa regions of the United States. The program was so effective that now BC exists naturally in every area infested by the eastern strain of the alfalfa weevil.

University of Illinois researchers determined that the BC program increased yields and reduced pesticide needs. Estimated control savings ranged from $6.50 per acre in southern Minnesota to $25 per acre in Virginia. Nationwide, the alfalfa weevil parasite saves farmers more than $45 million per year.

Cultural controls, such as crop rotation, tillage, and selective planting dates, are important components of many IPM programs.

Cultural controls, such as crop rotation, tillage, and selective planting dates, are important components of many IPM systems. John Miranowski of Iowa State University says that it can be economical to control corn rootworm by alternate year plantings of corn and soybeans without using soil insecticides or insect management advisory services. For example, Iowa producers' net returns can be as much as 15 times greater under such a system than when continuously planting corn and using insecticides.

Farmers' decisions about when and how much pesticide to use can be aided by knowing expected pest severity in the region and their own acreage. Researchers at the University of Illinois are devising a system to forecast the infestation likelihood and intensity of three soybean insects. Soybean growers who routinely apply insecticides to control these insects or hire people to check on insect buildup would, instead, rely on the forecast and take action only when a pest problem is likely.

USDA economist Joe Moffitt says the forecast will have to be at least 90 percent accurate to be of value to Illinois soybean growers. At 100-percent accuracy, producers could expect to benefit, on average, by about 67 cents per acre.

Wider use of IPM systems will hinge on whether they're more effective and economical to farmers than traditional control techniques. In some cases, a farmer's judicious use of a single chemical or other pest control method is optimal, and the concept of IPM does not apply. In other instances, costs can be reduced and yields improved through increased information on the pests, integration of methods to manage them, or area-wide programs to increase the efficiency of pest control.

Even then, farmers may have to be convinced to switch, a decision that will take into consideration current investment in equipment, familiarity and preferences for present practices, and the lingering uncertainty about the effectiveness of a new and untried IPM system.

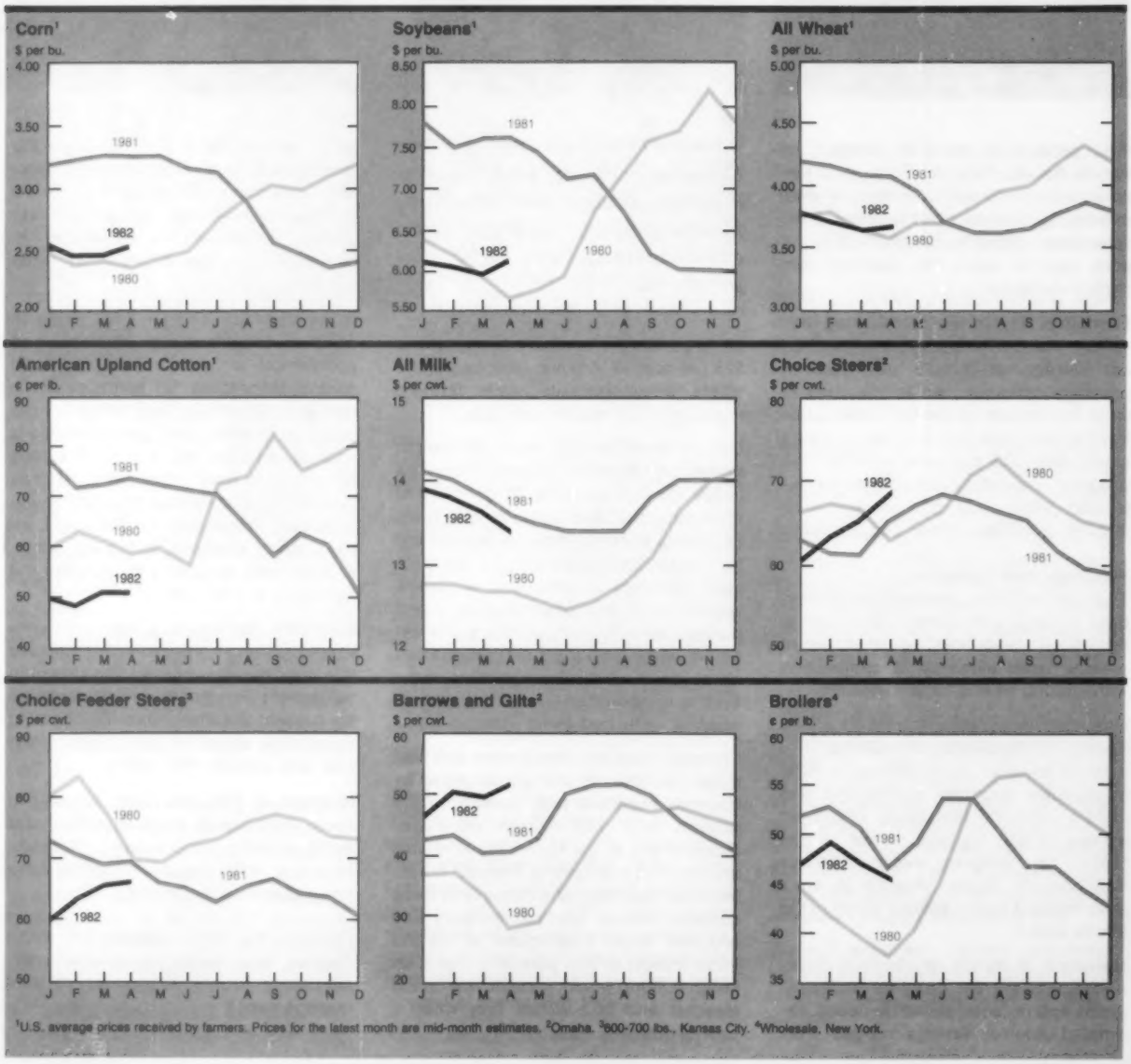
However, if IPM can lower production costs, improve or maintain yields, and avoid adverse environmental hazards, farmers will begin adopting the programs on a wider scale. □

[Written by ERS economists John Schaub and Katherine Reichelderfer, specialists in the economics of pest management.]

FARMLINE TRENDS

Monthly Price Monitor

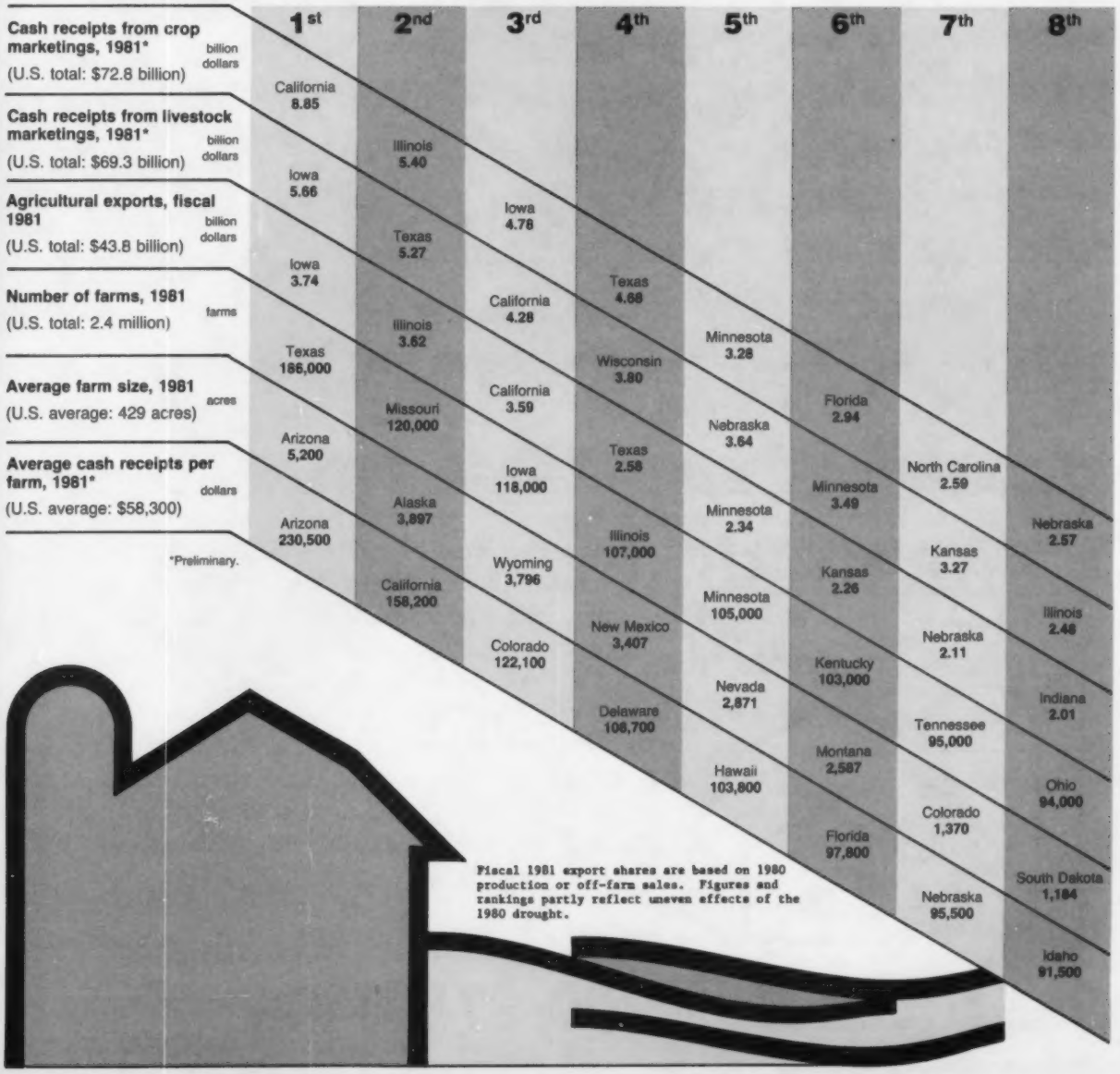
Mid-April farm prices rose in all categories except milk and broilers. But crop price gains were very small—corn up 5¢ a bushel, soybeans up 12¢, wheat up 1¢, and cotton up a fraction of a cent per pound. Among livestock, Choice steer prices increased to almost $69 per cwt.—the highest they've been since September 1980. Choice feeder steers rose for the third straight month, but they were still $3 below April 1981 prices. Barrow and gilt prices went over $52, the highest since February 1979. Broilers lost 2¢ a pound from March, remaining below year-earlier prices.



[1]U.S. average prices received by farmers. Prices for the latest month are mid-month estimates. [2]Omaha. [3]600-700 lbs., Kansas City. [4]Wholesale, New York.

Top Farm States

Which states come out on top? It depends on the measure. California, Illinois, Iowa, and Texas are hard to miss, but more than two dozen different states are represented in the rankings below. That's testimony to the diversity and strength of American agriculture.



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